EFFECT OF EARLY MOBILIZATION TRAINING ON GROSS MOTOR FUNCTION AND FUNCTIONAL OUTCOME IN HEMIPARETIC STROKE SUBJECTS

- An Experimental Study

Dissertation submitted to The Tamil Nadu Dr. M.G.R. Medical University towards partial fulfilment of the requirements of **Master of Physiotherapy [Advanced PT in Neurology] Degree Programme.**

KMCH COLLEGE OF PHYSIOTHERAPY

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Post Box No. 3209, Avanashi Road, Coimbatore-641 014.

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CERTIFICATE

This is to certify that research work entitled **"EFFECT OF EARLY MOBILIZATION TRAINING ON GROSS MOTOR FUNCTION AND FUNCTIONAL OUTCOME IN HEMIPARETIC STROKE SUBJECTS"-An Experimental study** was carried out by the candidate bearing the **Register No: 27091612**, KMCH College of Physiotherapy towards partial fulfillment of the requirements of the **Master of Physiotherapy (*Advanced PT in Neurology*)** of the Tamil Nadu Dr. M.G.R. Medical University, Chennai-32

PROJECT GUIDE

Mr. K.SENTHIL KUMAR, M.P.T,
Vice Principal,
KMCH College of Physiotherapy,
Coimbatore- 641014.

PRINCIPAL

Dr. EDMUND M. D'COUTO,
MBBS.Dip.Phy.Med & Rehab,
KMCH College of Physiotherapy,
Coimbatore- 641014.

INTERNAL EXAMINER

EXTERNAL EXAMINER

Dissertation evaluated on:

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CONTENTS

ABSTRACT

Objective: To study the effect of early mobilization training on gross motor function and functional outcome following acute stroke. **Design:** Pre and post test experimental study. **Sample size:** Twenty hemiparetic stroke subjects within onset 24-48 hours allocated ten in each group. Age between 40-60 years. Motor arm and leg-2 (NIHSS), Dynamic balance sitting score-poor (Functional balance grade scale).**Intervention:** Both groups were treated with conventional therapy on second day of stroke, with experimental group received early mobilization training which was started with in 24-48hours of stroke onset and the control group were mobilized after one week of stroke onset. **Outcome measure:** Motor assessment scale for gross motor function, Barthel index for functional outcome. **Results:** Statistical analysis was done by using ‘t’ test, which shows there was a significant improvement in gross motor function with early mobilization training group than conventional group. **Conclusion:** Early mobilization training is feasible and effective in improving gross motor function in hemiparetic stroke subjects.

KEY WORDS:

NIHSS-National institute of health stroke scale.

MAS-Motor assessment scale.

1. INTRODUCTION

The World Health Organization (WHO) defines Stroke as a “rapidly developing clinical signs of a focal /global disturbance of cerebral function, with symptoms lasting more than 24 hours or longer, or leading to death, with no apparent causes other than vascular origin.”

The brain is functionally active due to rapid blood flow on the physiological basis of circulation in the body. The most common causative factor which disturbs the brain after trauma is of vascular origin where the protective mechanism of brain fails resulting in permanent damage.

Stroke is the third leading cause for the death in this world. Stroke as a neurological illness has third longest stay for rehabilitation. It is one of the leading causes for severe handicap in the world.

This can be due to ischemia caused by thrombosis or embolism or due to hemorrhage. Most commonly occur in ischemic which accounts for 85% and hemorrhage is 50%. The effects of stroke are variable and may include impairment in motor and sensory system, emotion, language, perception, cognitive function and also indirect complications. More than 60% of stroke survivor suffers from

persistent motor deficits that impair motor function probably has the greatest impact on ADL independence.

Stroke rehabilitation is a programme designed to help the stroke victim to overcome the disability resulting from brain damage and to enable him or her at physical, psychological, social levels despite the disability that remains after all spontaneous recovery from brain damage is ceased.

Early administration of physical rehabilitation following acute stroke may improve the functional mobility of patient, so who they can be discharged home (or) rehabilitation setting earlier. In acute stroke, most of the hospitals enforce the patient to be in bed rest for prolonged days.

In the older studies they have used bed rest in acute stroke, and conventional therapy with in the bed, like passive movements and stretching. But recent years researchers have used rehabilitation programme of out of bed activities based on task specific exercise to improve the motor function.

Acute stroke rehabilitation may improve the functional mobility of patient and it is depends on patient's medical stability, physical functioning and active participation in rehabilitation programme.

Early mobilization is one of feature of stroke unit care. One study demonstrated substantially better outcomes for patients managed in stroke units that incorporated early mobilization as compared to those patients who received general medical ward care and not mobilized early in intensive care unit.

Bent indredavik et al (2007) also stated that Mobilization is defined as out of bed activity and the word ‘early’ is defined as the first week after onset of stroke symptoms and ‘very early’ as within 24 to 48 hours after symptom onset.[5]

1.1 NEED FOR THE STUDY

Bernhardt (2007) in their study they concluded that acute stroke patients are at very high possibility of developing complications, resulting from immobility which may report for up to 51% of deaths in first 30 days after ischemic stroke with over 62% complication happening in first week. Complication for instance spasticity, pressure sore, depression, deconditioning and infection. This made the negative effect on functional outcome and barriers to most favorable recovery.[10]

Motor recovery is habitually incomplete and depends on occurrence of co-morbid condition and other motor impairements.**Peter Langhorne et al (2007)** suggested in their their study, motor impairment after stroke typically affects the control of movement in contra lateral side of body, these impairment which can be regarded as a loss or limitation of function in muscle control or movement or limitation in mobility.[51] So patients are activated as early as possible post onset, with medically stable and starting rehabilitation procedures in acute stroke can allow to assist neurological recovery, prevents the complication and improves long term outcome and quality of life. **Maulden et al (2005)** in their study they hypothesized that the optimal window for increased synaptic plasticity may occur early in the post stroke period, allowing for greater gains if rehabilitation is carried

out during this critical interval.[43] In current approaches, the authors suggested that in the acute rehabilitation of stroke patients, physiotherapy treatment using the motor relearning programme (MRP) is preferable then the other approaches. **Julie Bernhardt (2007)** in his study, Mobilization "in bed" is not mobilization. There is no opportunity for any form of movement beyond rolling side to side. Clearly getting out of bed is likely to affect more then just blood flow to brain.[5]

Birgitta et al (1999) the patients in the MRP group were mobilized earlier on in the rehabilitation and kept active to a greater extent than patients in the bobath group. Previously several studies were conducted by the effect of early mobilization on death, disability, complication and physiological variables following acute stroke.

But up to date, limited literature is available in early mobilization in acute stroke subjects on motor function. So in this study an effort has been made to analyze the effect of early mobilization based on motor relearning programme for gross motor function and functional outcome in acute stroke subjects there by promoting the functional independence and quality of life.

2. REVIEW OF LITERATURE

2.1. STROKE:

- **Arthur anconitz et al (1993)** defined Stroke as a loss of functioning brain tissue, with an accompanying disability, such as weakness, paralysis, blindness, (or) speech impairments. Stroke is triggered by deprivation of blood to part of brain.
- **Rowan harwood et al (2005)** defined a rapidly developing episode of focal (or) global neurological dysfunction lasting longer than 24 hours (or) leading to death and presumed vascular origin.

2.2. INFLUENCE OF MOTOR IMPAIRMENT ON DISABILITY:

- **Chae et al (2005)** In this studies they to investigate the fugl-meyer (FMA) motor impairment scale and physical disability measured by FIM as prediction of physical independence after stroke. Fourty eight patients are admitted to rehabilitation within six weeks of stroke onset. They suggested that physical activity dependency of daily living after stroke is primary depend on the degree of motor impairment.[13]

- **Farhan et al (2005)** A total of 100 patients with ischemic stroke was assessed at neurology department. River mead motor assessment to measure motor impairment and Functional independent measure (FIM) to measure disability were used and the baseline and post stroke values were taken in seventh to tenth day and three month. They concluded that stroke related motor impairment and disability were found to be significantly correlated with each other.[27]
- **Kenneth et al (2001)** in their study, motor and cognitive abilities were measured by FMA and neurobehavioral cognitive status examination and functional performance was measured by FIM assessment was conducted at admission, after two weeks and at discharge. The results from this study, motor impairment, balance, lower limb ability, strongly accounts for functional recovery in rehabilitation of patients with in stroke staying in hospital.[37]
- **Patel et al (1998)** performed a study with the aim of assessing the relationship between impairment and functional outcome. Mobility and ADL were assessed at 1, 3, and 6 month post stroke by using functional independence measure, barthel index, Lawton instrumental ADL. The

cumulative deficits post stroke affect patients functional outcome in the first six months.[49]

- **Nancy et al (1999)** done a study with the purpose to describe the disabilities experienced by person with stroke during first year and explore the evaluation of impairment, disability, handicap, and health related quality of life. They suggest that much of improvement in impairment and disability occurs during the first month and then reaches a plateau. Handicap and quality of life continue to be issue later.[47]
- **Masiero et al (2007)** had done a study to investigate predictive factors for ambulatory recovery in stroke patients undergoing rehabilitation. Functional status at admission and discharge was evaluated by FIM and its motor component, upper and lower motricity index, trunk control test. Results indicate that age and level of motor and functional impairment measure at baseline are significant predictors of ambulatory outcome.[42]

2.3. GROSS MOTOR DYSFUNCTION IN STROKE:

- **Dean et al (1992)** in their study stating that balance impairment in sitting is common after stroke. This disability in resulting from not only neural lesion

such as weakness, loss of co ordination but also tendency to adapt behavior to avoid the threat to balance. More than 70% stroke patients admitted to rehabilitation are unable to reach side wards to floor while sitting.

- **Joanne et al (2006)** in his study, evaluates stroke patients with upper limb motor deficits using measure of impairment and activity limitation to quantify recovery of of upper limb function, box and block test performance was used as a outcome over five weeks. Author's data shows that deficits in strength appear to be most influential sensorimotor association with limited reaching performance in acute hemiparesis.[33]
- **Richared et al (2007)** in their study suggested that sit to stand activities is important in every function, but independent in activity is often lost after stroke.[54]
- **Patricia et al (2009)** conducted a study to analyze which stroke related physical impairment influence the performance in the six minute walk test. They concluded stroke related impairments are power full modifiers of performance in the six minute walk test. Motor deficits of lower limb and decreased balance contribute to distance an adult with stroke can walk on 6 minutes.[50]

- **Cameron et al (2003)** in his study compared the kinetic energy and duration of task during sit to stand and curb-climbing of two groups, in hemiparesis stroke patients and matched control also. Study design is descriptive and correlation, physical performance variables measured was standing balance, paretic extremity weight bearing, and knee extension strength. They revealed that impaired balance and maximum weight bearing are relevant to sit to stand and curb-climbing limitation after stroke.

2.4. EARLY MOBILIZIATION TRAINING:

- ***B.*Indredavik et al *(1999)*** done a study with an aim of identifying the differences in treatment between stroke unit and general ward and which aspect of the stroke unit care was most responsible for the better outcome. Only 206 patients were included in this study. They analyzed that shorter time to start of mobilization/training was the most important factor significantly association with the outcome, discharge to home within 6 weeks. They concluded that shorter time to start the mobilization was most important factor associated with discharge to home followed by stabilized blood pressure.[6]

- **Toby B Cumming (2008*)*** in their study of randomized control design, the patients in the very early mobilization group receive mobilization earlier within 24 hours and more frequently than in standard group. Totally 71% patients were included and patients were assessed on the irritability, depression and anxiety scale at multiple times. He concluded that early mobilization may reduce depressive symptoms in stroke patients at 7 days post stroke.[36]
- **Julie Bernhardt et al (2008)**, they performed a randomized control trial with blinded outcome assessment which hypothesing that very early rehabilitation protocol would be safe and feasible.71 patients were recruited within 24 hours and randomly assigned to receive standard care (SC) or SC along with early mobilization. They concluded that mobilization commencing within 24 hours of symptom onset appears both safe and feasible. Early mobilization may be one of the simplest yet most important components of effective stroke unit care.[6]
- **Geis et al (1997)** suggested in their study that during the acute management of stroke, there are rehabilitation medicines issues that must be addressed to maximize facilitation of recovery includes techniques promoting mobilization, performance of self care activities of daily living.

This technique helps to facilitate early recovery, and acts as guidelines for assessing rehabilitation needs after acute care.[30]

- **Shutter et al (2002)** in their study they suggest that the approach to therapy for acute stroke patient should incorporate a variety of measures to facilitate early activation. Therapy should include getting the patient out of bed as soon as possible and facilitating the patient's as much as possible in mobility activities such as rolling over in bed, sitting up, and transferring.[45]
- **Torunn askim et al (2009)** performed a study to assess early motor network changes after acute ischemic stroke in patients treated with very early mobilization and task oriented therapy in a comprehensive stroke unit. Patients were assessed by functional magnetic imaging and by clinical tests within the first week after stroke and three months later. They concluded the changes in motor activity between acute and chronic phases seem to correspond to motor learning process.[66]

2.5. MOTOR RECOVERY FOLLOWING STROKE:

- **Gereon et al (1999)** in their study used positron emission tomography to study the functional reorganization motor and sensory system in

hemiplegic stroke patients, before motor recovery. Regional cerebral blood flow (r CBF) was measured in six hemiplegic patients with single, sub cortical infarct. Results shows changes of cerebral activation in sensory and motor system occur early after stroke and may be a first step forward in restoration of motor function following stroke.[31]

- **Gao cong et al (2001)** stated that early rehabilitation training of the patients with stroke hemiplegic may obviously improve motor function of upper and lower limbs and raises ADL scores.[29]
- **Catherine et al (2000)** concluded that during the early rehabilitation following stroke subject who were admitted to stroke unit and also received daily rehabilitation therapy for up to eight weeks exhibited improvement in postural sway and activities based, range of balance.
- **Frederice et al (1970)** concluded that there is no contraindication to early initiation of rehabilitation and those patients for whom initiated immediately after stroke have the most rapid and optimal recovery, 90-95% of hemiplegia got good return of function in upper extremity, 65% of patients became independent in self-care and ambulation.[28]
- **Tarasova et al (2008)** done a study in which ninety six patients were examined before and after complete rehabilitation, and measure of

functional disablement, functional disorder, and quality of life also tested. Results proved that intensive rehabilitation in the acute phase of stroke to an improvement of the functional state and a reduction of the measure of the impairment of motor and cognitive function.[64]

- **Feys et al (2004)** performed a study of single blinded, randomized controlled multicenter trial, 100 patients was allocated to two groups, sensorimotor stimulation was given to experimental group and they were evaluated by the level of impairment and action research arm test and barthel index. Results showed that adding in early, repetitive and targeted stimulation to arm during acute phase resulting in long lasting effect on motor function in patients.
- **Hayes and corroll (1986)** suggested that earlier ambulation have shown to reducing mortality, earlier return of mental and motor function and activity of daily living.

2.6. MOTOR RELEARNING PROGRAMME:

- **Dora yl Chan et al (2006**) had conducted a study to find out the effects of motor relearning programme in promoting physical function and task performance for stroke patients.52 patients were selected. Berg balance

scale, timed up and go test, functional independence measure are used as outcome. He suggested that motor relearning programme was found to be effective for enhancing functional recovery of stroke patients. Both 'sequential 'and 'functional –based 'concepts are important in applying the motor relearning approach to the rehabilitation of stroke patients.

- **Langhammer and Stanghelle (2000)** conducted a study in randomized control trial. Compared the bobath approach and the motor relearning programme in stroke patients.61 patients was taken.33 patients received motor relearning programme and 28 patients received bobath approach. Tested after 3 days, 2 weeks after admission and 3 months post stroke by Motor assessment scale, Sordring motor evaluation scale, Barthel index and Nottingham health profile. The results showed both groups improved in motor assessment scale and sordring motor evaluation scale. But the motor function improvement was significantly greater in the MRP group. Finally, they concluded that in the acute rehabilitation of stroke, using the MRP is preferable to using bobath approach.[41]
- **P M Van Vliet et al.(2005),**they Compared bobath based physiotherapy with movement science based physiotherapy intervention for stroke in 120 subjects and found no significant differences in movement abilities or

functional independence between patients receiving Bobath based or movement science based intervention in stroke patients.

2.7. MOTOR ASSESSMENT SCALE:

- **Pool and Whitney (1988)** stated to establish the concurrent validity and inter rater reliability of motor assessment scale and fugl-meyer assessment scale; they concluded that there is high correlation between MAS and FMA.[52]
- **Aarmodt et al (2006)** done a study to investigate the two aspects of reliability of MAS in 24 patient's shows a highly reliable value with an average inter rater correlation of 0.95 and an average test retest correlation of 0.98.[2]
- **Carr, J.H., shepherd et al (1985)** performed a study on "investigation of a new motor assessment scale for stroke patients"-they found it highly reliable and its validity and usefulness in measuring the progress of patients in physical therapist should be investigated.[15]
- **Dean, C.M., Markey et al (1992)** conducted a study on "motor assessment scale scores as a measure of reliable outcome following stroke", reported that significant difference between mean score for each item on the MAS

from admission to discharge from stroke rehabilitation after an average of seventy one days of rehabilitation.

2.8. THE BARTHEL INDEX:

- **Salter et al (2006)** concluded that barthel index of activities of daily living was originally intended as simple index independence by which to quantify the ability of a patient with neuromuscular or musculoskeletal disorders to care for him or himself and is most widely used measures of functional disability.[59]
- **Granger et al (1988)** in their study they have found that barthel index to be highly reliable and consistent with other stroke evaluations.
- **Wade and Collin et al (1988)** performed a study concluded that barthel index may not able to detect change within an individual who is independent but is able to detect when a patient require assistant. This distinction may, have more significance to clinical practice then to research.

3. AIM &OBJECTIVES

3.1. AIM:

To study the effect of early mobilization training on gross motor function and functional outcome in hemiparetic stroke patients.

3.2. OBJECTIVES:

- To evaluate the effect of early mobilization training started within 24- 48 hours following stroke in hemiparetic stroke subjects.
- To compare the effect of early mobilization training started with in 24- 48 hours on gross motor function, and functional outcome in hemiparetic stroke patients.
- To implement the technique into clinical practice.

4. MATERIALS & METHODOLOGY

METHODOLOGY

4.1. Study design:

Pre and post test experimental study design.

4.2. Study population:

Acute MCA hemiparetic stroke subjects.

4.3. Study setting:

Kovai Medical Center and Hospital, Coimbatore.

4.4. Sample size:

20 ischemic acute stroke subjects.

Group I; 10 subjects (mobilization started after a week of stroke onset).

Group II; 10 subjects (mobilization started within 24-48 hours of stroke onset).

4.5. Sample technique:

Purposive sampling.

4.6. Criteria for selection of patients:

Inclusion criteria:

1. Age 40-60 years.
2. Middle cerebral artery ischemic stroke.
3. Genders: both male and female.
4. Admitted within 24-48 hours of symptom onset.
5. Medically stable, confirmed by neurologist.
6. Motor arm &leg-2(National institute of health stroke scale)
7. Dynamic balance sitting score-poor(Functional balance scale)
8. Should react to verbal commands.

Exclusion criteria:

1. Hemorrhagic stroke
2. Progressive neurological disorder.
3. Musculoskeletal impairments
4. Acute coronary syndrome.
5. Severe heart failure.

6. Cognitive impairment.
7. Medically unstable.

4.7. HYPOTHESIS:

4.7.1 Null hypothesis:

H_{O1}- There is no significant improvement on gross motor function, with mobilization training started after a week following stroke in hemiparetic stroke subjects.

H_{O2}- There is no significant improvement on functional outcome, with mobilization training started after a week following stroke in hemiparetic stroke subjects.

H_{O3}- There is no significant improvement on gross motor function, with early mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

H_{O4}- There is no significant improvement on functional outcome, with early mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

H_{O5}-There is no significant difference exists between early mobilization training started within 24-48 hours and mobilization training started after a week following stroke on gross motor function in hemiparetic stroke subjects.

H_{O6}-There is no significant difference exists between early mobilization training started within 24-48 hours and mobilization training after a week following stroke on functional outcome in hemiparetic stroke subjects.

4.7.2. Alternate hypothesis:

H_{A1}- There is a significant improvement on gross motor function with mobilization training started after a week following stroke in hemiparetic stroke subjects.

H_{A2}- There is a significant improvement on functional outcome with mobilization training started after a week following stroke in hemiparetic stroke subjects.

H_{A3}- There is a significant improvement on gross motor function with early mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

H_{A4}- There is a significant improvement on functional outcome with early mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

H_{A5}-There is a significant difference exist between early mobilization training started within 24-48 hours and mobilization training after a week following stroke on gross motor function in hemiparetic stroke subjects.

H_{A6}-There is a significant difference exist between early mobilization training started within 24-48 hours and mobilization training started after a week following stroke on functional outcome in hemiparetic subjects.

4.8. PROCEDURE:

A written consent was taken from patients who fulfilled the inclusion and exclusion criteria. Pre test was taken with Motor assessment scale for gross motor function and barthel index scale for functional outcome.). Subjects were randomly allocated to 2 groups. Patients in Group 1 received conventional physical therapy with mobilization training started after a week of stroke onset. And Patients in Group 2 received Conventional physical therapy with early mobilization training started within 24-48 hours of stroke onset for 2 weeks. Post test was taken after 2 weeks with the same outcome measures.

4.8.1. CONVENTIONAL THERAPY:

Group I- procedure:

(1)Electrical stimulation:

Electrical stimulation was given to upper and lower limb muscles.

- ✓ Type of current- Faradic current.
- ✓ Pulse duration- 1ms.
- ✓ Pulse frequency- 50Hz.
- ✓ Pulse amplitude - Sufficient enough to achieve desired strength of contraction.
- ✓ Muscles- Triceps, wrist and finger extensor, dorsiflexors of ankle.
- ✓ No of contraction: based on response of muscle in order to avoid muscle fatigue.

(2) Stretching:

- ✓ Type - Manual passive stretching.
- ✓ Muscles - Biceps, triceps, long flexors of forearm, hamstring, and calf.

- ✓ Holding time -15 sec.
- ✓ Repetition - 5times.

(3) Normalization of tone:

- ✓ Slow sustained stretching of biceps and wrist flexors, hamstrings and calf.
- ✓ Cryotherapy to biceps and hamstrings.
- ✓ Upper limb weight bearing position in long sitting.
- ✓ Quick stretching to facilitate muscle tone.
- ✓ Slow rocking movements.

(4)Range of motion exercises:

- ✓ Passive movements and active assisted exercise for upper and lower limb.

4.8.2. EARLY MOBILIZIATION TRAINING:

Group II-Procedure:

Mobiliziation

Definition:

"The act of getting a patient to move in the bed, sits up, stand and eventually walk".

In this study, mobilization as a form of exercise consists of getting out of bed, standing and walking based on motor relearning programme along with rest in between.

With first 3 days after stroke, blood pressure, oxygen saturation, heart rate, temperature should be circumspectly monitored before and after each mobilization.

Supine lying:

- Therapist lifts the patient's arm and supports it in forward flexion. Patient attempts to reach up towards ceiling.

Picture 1: Encouraged to log rolling.

- Instructions:

  “Reach up towards the ceiling.”

  “Think about using your shoulder.”

  “Now let your shoulders go back on to the bed.”

- Then asking him to take his hand to his head and take his hand above his head to the pillow.

Instructions:

"See if u can take your down to your forehead-gently-don't let your hand drop."

"See if you can take your hand above your head to the pillow."

- Rolling to either side.
- Pelvic bridging.

Inside lying

- Therapist encourages the patient to turn his head, assist him to bring his shoulder and arm forward, and to flex his hips and knees.
- Therapist assists the patient to lift his head off the pillow and patients attempts to lower his head to pillow.

Instructions:

"Lower your head to the pillow."

"Lift your head from the pillow."

"This is what you will do when I help you sit up over the side of the bed."

- Patient lifts his head laterally, while therapist, one hand under the shoulder and other pushing downwards on his pelvis, helps him to move up into the sitting position.

  Instructions:

  "Now, sit up and I will help you."

In sitting

- Sitting at a table, patient practices reaching forward and upward. He should work within the range he can control, gradually increasing it. Instruction:

  "Reach out to touch this.don't let your arm drop."

- Patient sitting with arm supported on table, forearm in mid position, fingers and thumb around a glass. Patient attempts to lift the glass and lower it.

Picture2: Encouraged to lift up the class.

Instruction:

"Lift the glass up."

"Let it down slowly."

Progress to:

"Move the glass to this point on the table."

- Patient hands in lap, patient turns head and trunk to look over his shoulder returns to mild position, repeats to other side.

Instructions

"Turn around and look behind you"

"Turn your body as well as your head"

"Don't lean back"

- Patient reaches forward to touch an object, downwards towards floor and to both sides; each time returning to upright position, therapist supports the affected arm while necessary.

Instruction:

"Reach out and touch"

"Look at the object."

"Now, sit up again."

"Let's do it again"

- Therapist assists the patient sideways to support himself on the forearm of his affected side on one (or) two pillows. Then sitting up from this position.

Instruction:

“Lower yourself on to the pillow.”

“Now sit up.”

Standing up

- In sitting, Patient feet flat on floor, then practices inclining his trunk forward by flexing at hips with the neck and trunk extended, with enough momentum to move the knees forward.

Instruction:

“Move your shoulders in front of your feet and push down and back through your feet.”

“Push down more through affected foot.”

“Look straight ahead.”

- With his shoulders and knees forward, the patient practices standing up. The therapist can give him the idea of pushing down through his affected foot by pushing down through his knee along the line of the shank while moving forward.

Instruction:

“Press down through your foot and stand up.”

“When you are standing: bring your hips forward.”

- Therapist may need to help the patient with the forward movement of shoulder and knee at the beginning of the movement.

Instruction:

“Move your bottom down and back and sit down.”

Picture 3: Encouraged to move forward

"Move your knees forward."

- Standing with feet a few inches apart, the patient looks up at ceiling.

  Instruction:

  "Look up at the ceiling."

  "Bring your hips forward."

  "Move forward at your ankles as you look up."

- Reaching forward, sideways, backwards encouraged.

  Instructions:

  "See if you can touch this. Come on, just a little further."

  "Don't shift your feet."

- Patient takes a step forward with intact leg then backwards.

  Instructions:

  "Keep your weight on this affected foot."

  "Take one step forward with your other foot."

"Your hip should move in front of your foot."

"Now, step backwards."

- Pick up a glass from the floor with one hand (or) bimanually.
- Patient takes a step forward with intact leg, then backwards.

Walking

- Patient practices stepping forward and backward with intact leg as above, making sure he extends his affected hip as he steps forward.

Instructions:

"Take your weight through affected leg."

"Step forward with intact leg. You need to move forward at affected ankle."

- Standing with intact leg in front of affected leg. Patient practices moving his weight forward over his intact foot and back while maintaining the knee extension of the affected leg.

Instruction:

"Move your hips forward over intact foot."

"Keep your knees straight."

"Practice bending and straightening affected knee a few degrees."

"Keep your hip forward while you do this."

- In standing hips in front of ankles, patient practices shifting his weight from one foot to the other. Therapist indicates with her finger how far his pelvis should shift.

  Instructions:

  "Move your weight over on to your right foot."

  "Now move it back on to your left foot."

  "To move to the right, push gently through your left foot."

- Walking in sideways and backwards is encouraged.

  Instruction:

  "Let's walk sideways, stand on your right leg and step sideways with your left foot."

  "Stand on your left leg. Now, feet together."

- Walking combined with other activities such as conversation.

Repetition: 10 repetitions per exercise for 6 days a week.

Treatment duration: 1 hour daily.

No. Of session: 2 times per day.

4.9. OUTCOME MEASURES:

1. Motor assessment scale (AppendixIII).

2. Barthel index scale (Appendix IV).

4.10. STATISTICAL TEST

Pre-test and Post-test values of the study was collected and assessed for variation in improvement & their results will be analyzed using Independent `t' test and Paired `t' test.

- INDEPENDENT `t' TEST (between groups)

$$t = \frac{\overline{X1} - \overline{X2}}{S} \sqrt{\frac{n_1 n_2}{(n_1 + n_2)}}$$

Where,

$$S = \sqrt{\frac{\sum d_1^2 + \sum d_2^2}{n_1 + n_2 - 2}}$$

- PAIRED `t' TEST (within groups)

$$t = \frac{\bar{d}\sqrt{n}}{S}$$

Where,

$$\mathbf{S} = \sqrt{\frac{\sum \boldsymbol{d^2} - \left|\bar{\boldsymbol{d}}\right|^2 \times \boldsymbol{n}}{\boldsymbol{n-1}}}$$

S =combined standard deviation

$d_1 \& d_2$ =difference between initial & final readings in group A &group B respectively.

$n_1 \& n_2$=number of patients in group A & group B respectively.

$\overline{X_1} \& \overline{X_2}$ =Mean of group A & group B respect

5. DATA PRESENTATION

5.1. TABULAR REPRESENTATION

TABLE 1: PAIRED‘t’ TEST

GROUP 1- CONTROL GROUP

SCALES	MEAN VALUES		Calculated ‘t’ Value	Table ‘t’ Value
	Pre-Test	Post-Test		
Motor Assessment Scale	7.1	9.7	4.64	1.833
Barthel Index	29.5	32.5	3.67	1.833

MOTOR ASSESSMENT SCALE:

For 9 degrees of freedom and at 5% level of significance, the table‘t’ value is 1.833 and the calculated ‘t’ value is 4.64. Since the calculated ‘t’ value is greater than the table‘t’ value the null hypothesis is rejected.

BARTHEL INDEX:

For 9 degrees of freedom and at 5% level of significance, the table‘t’ value is 1.833 and the calculated ‘t’ value is 3.67. Since the calculated’ value is greater than the table‘t’ value the null hypothesis is rejected.

TABLE 2

GROUP II: EXPERIMENTAL GROUP

SCALES	MEAN VALUES		Calculated ‘t’ Value	Table ‘t’ Value
	Pre-Test	Post-Test		
Motor Assessment Index	6.3	15.1	12.14	1.833
Barthel Index	29.0	34.0	4.7	1.833

MOTOR ASSESSMENT SCALE

For 9 degrees of freedom and 5% level of significance the table‘t’ value is 1.833 and the calculated’ value is 12.14. Since the calculated’t’ value is greater than the table‘t’ value the null hypothesis is rejected.

BARTHEL INDEX

For 9 degrees of freedom and 5% level of significance the table‘t’ value is 1.833 and the calculated t’ value is 4.7. Since the calculated’t’ value is greater than the table‘t’ value the null hypothesis is rejected.

INDEPENDENT‘t’ TEST:

TABLE 3

Pre-Test values: Group I and Group II

SCALES	MEAN VALUES		Calculated ‘t’ Value	Table ‘t’ Value
	Group I	Group II		
Motor Assessment Scale	7.1	6.3	1.24	1.734
Barthel Index	29.5	29.0	0.24	1.734

PRE TEST VALUES GROUP I AND II

MOTOR ASSESSMENT SCALE

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 1.24. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted.

BARTHEL INDEX

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 0.24. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted.

INDEPENDENT‘t’ TEST

TABLE 4

Post-Test values: Group I and Group II

SCALES	MEAN VALUES		Calculated ‘t’ Value	Table ‘t’ Value
	Group I	Group II		
Motor Assessment Scale	9.7	15.1	4.81	1.734

Barthel Index	**29.5**	**34.0**	**1.68**	**1.734**

POST TEST VALUES: GROUP I AND II

MOTOR ASSESSMENT SCALE

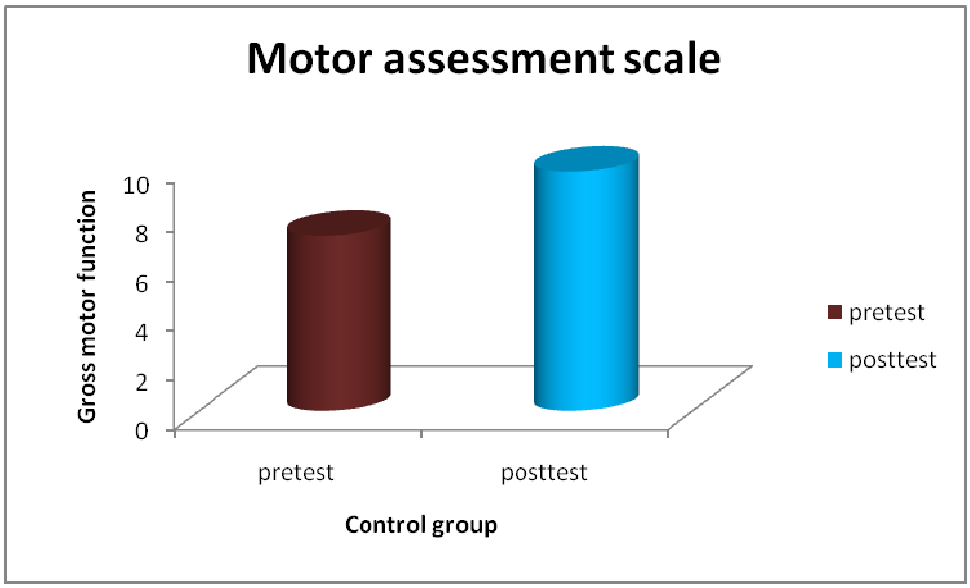
For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 4.21. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is rejected.

BARTHEL INDEX

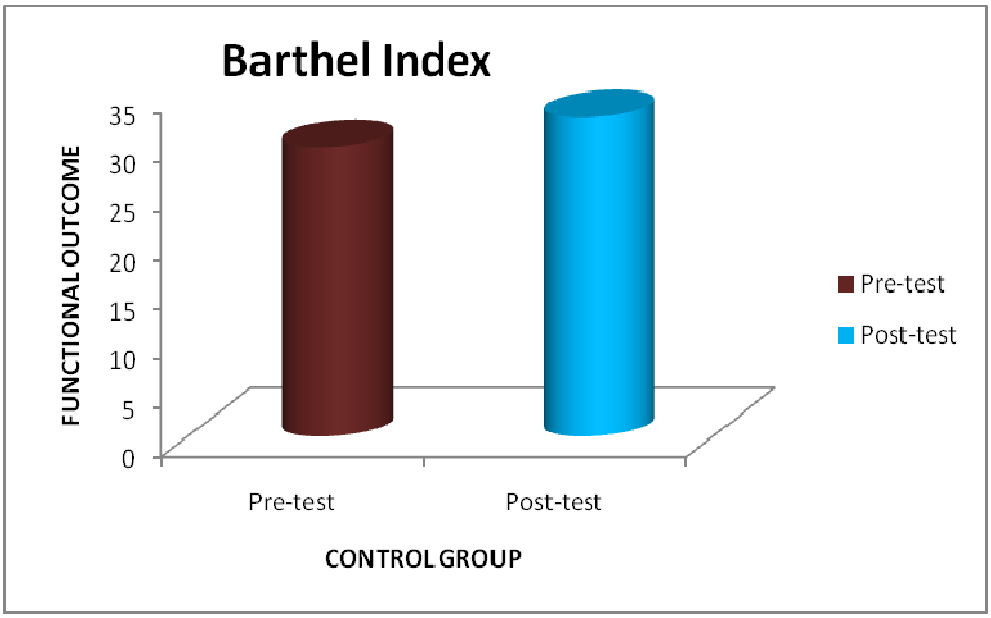
For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 1.68. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted.

5.2. GRAPHICAL REPRESENTATION

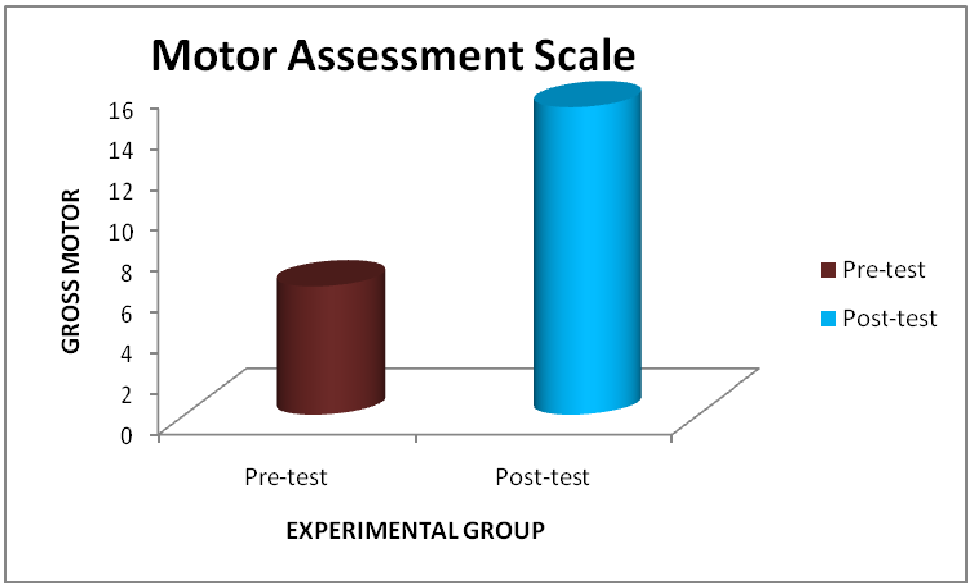
GRAPH 1: PRE AND POST TEST MEAN VALUES OF MOTOR ASSESSMENT SCALE IN CONTROL GROUP



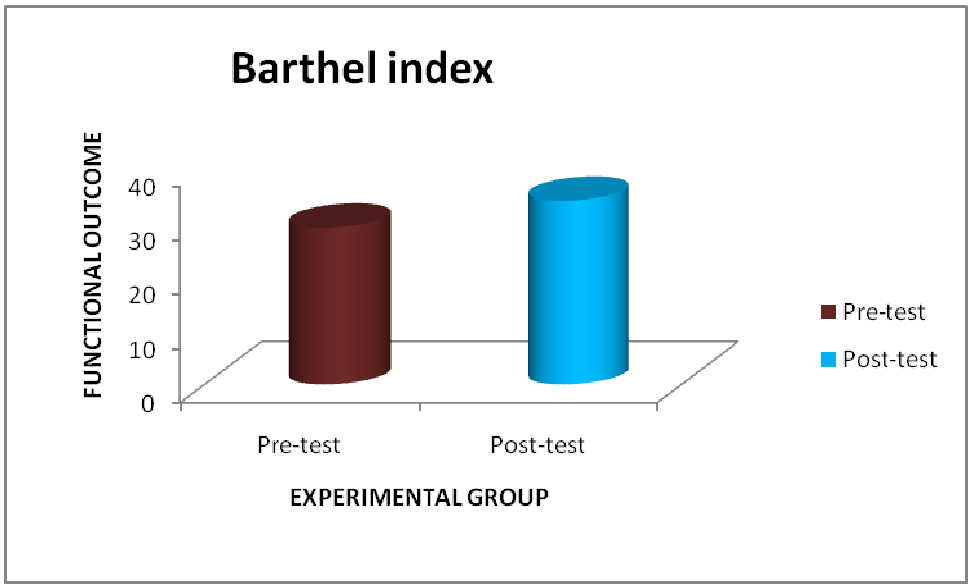
GRAPH 2 PRE AND POST TEST MEAN VALUES OF BARTHEL INDEX



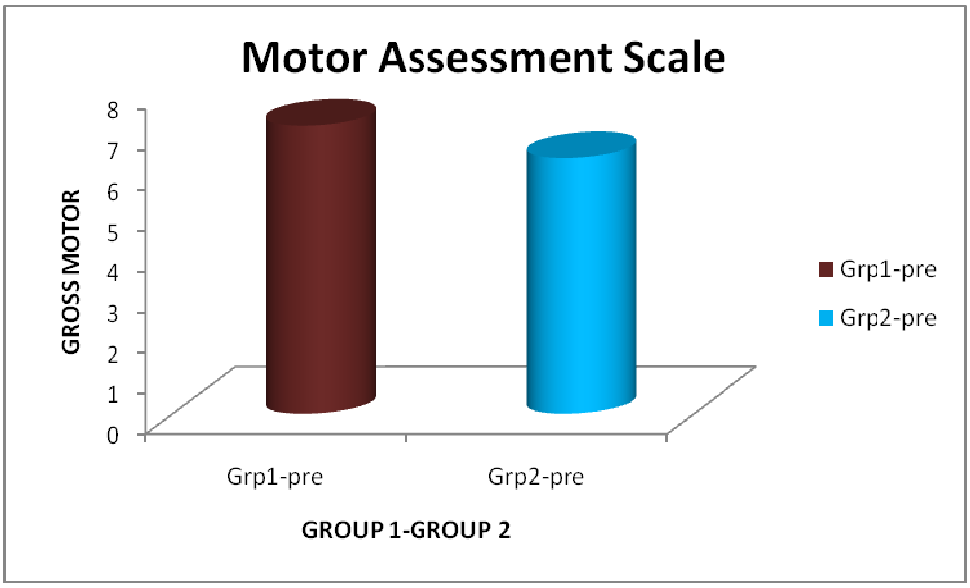
GRAPH 3: PRE AND POST TEST MEAN VALUES OF MOTOR ASSESSMENT SCALE IN EXPERIMENTAL GROUP.



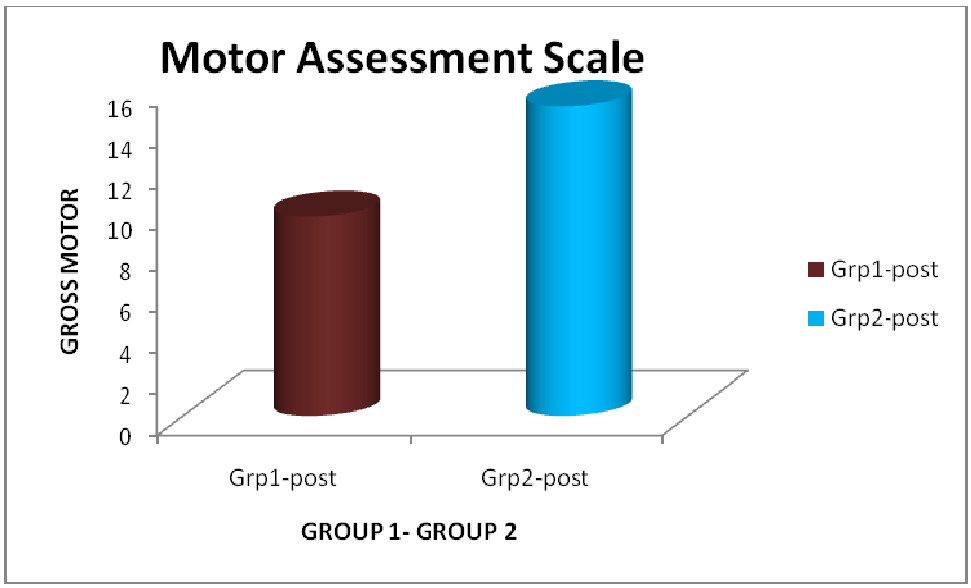
GRAPH 4 PRE AND POST TEST MEAN VALUES OF BARTHEL INDEX SCALE



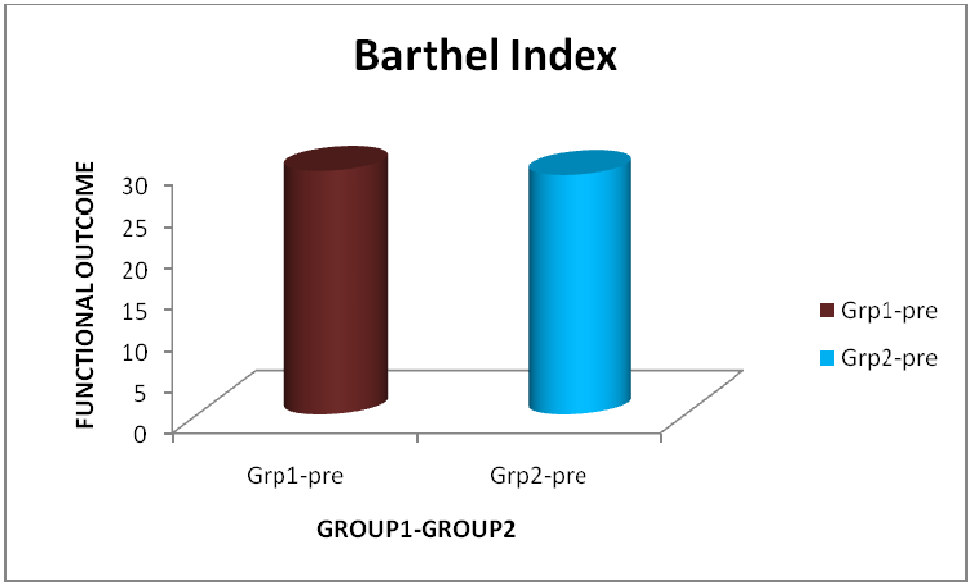
GRAPH 5 PRE TEST MEAN VALUES OF MOTOR ASSESSMENT SCALE



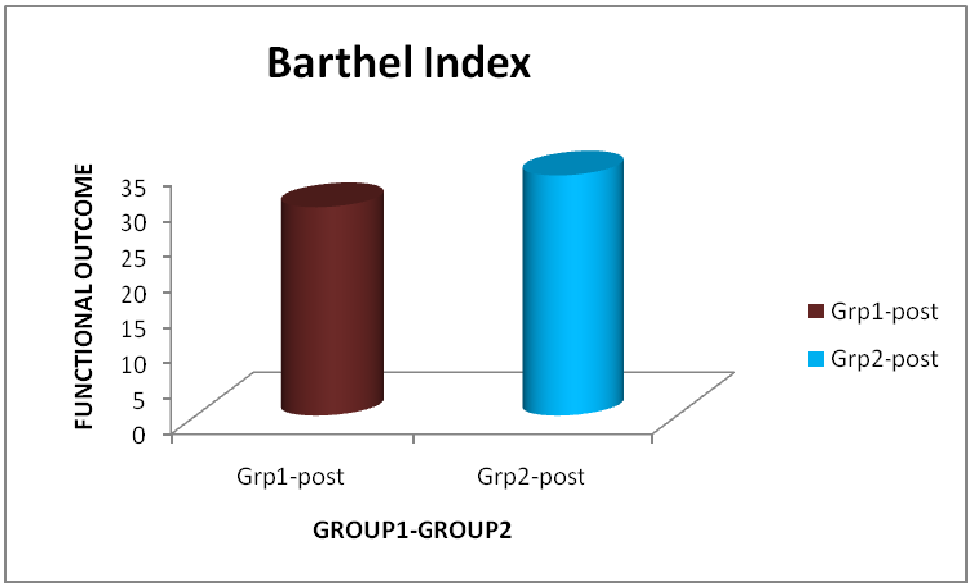
GRAPH 6 POST TEST MEAN VALUES OF MOTOR ASSESSMENT SCALE



GRAPH 7 PRE TEST MEAN VALUES OF BARTHEL INDEX



GRAPH 8 POST TEST MEAN VALUES OF BARTHEL INDEX



5.3 DATA ANALYSIS AND RESULTS

PAIRED't' TEST:

GROUP I: CONTROL GROUP

MOTOR ASSESSMENT SCALE:

For 9 degrees of freedom and at 5% level of significance, the table't' value is 1.833 and the calculated 't' value is 4.64. Since the calculated't' value is greater than the table't' value the null hypothesis is rejected .Thus, There is a significant improvement on gross motor function with mobilization training started after a week following stroke in hemiparetic stroke subjects.

BARTHEL INDEX:

For 9 degrees of freedom and at 5% level of significance, the table‘t’ value is 1.833 and the calculated ‘t’ value is 3.67. Since the calculated‘t’ value is greater than the table‘t’ value the null hypothesis is rejected. Thus, There is a significant improvement on functional outcome with mobilization training started after a week following stroke in hemiparetic stroke subjects.

GROUP II: EXPERIMENTAL GROUP

MOTOR ASSESSMENT SCALE

For 9 degrees of freedom and 5% level of significance the table ‘t’ value is 1.833 and the calculated‘t’ value is 12.14. Since the calculated‘t’ value is greater than the table‘t’ value the null hypothesis is rejected. Thus, there is a significant improvement on gross motor function with mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

BARTHEL INDEX

For 9 degrees of freedom and 5% level of significance the table‘t’ value is 1.833 and the calculated t’ value is 4.7. Since the calculated‘t’ value is greater

than the table‘t’ value the null hypothesis is rejected. Thus there is a significant improvement on gross motor function with mobilization training started within 24-48 hours following stroke in hemiparetic stroke subjects.

INDEPENDENT’t’ TEST:

PRE TEST VALUES GROUP I AND II

MOTOR ASSESSMENT SCALE

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 1.24. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted. There is no significant exist between the groups. Hence homogeneity is maintained

BARTHEL INDEX

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 0.24. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted. There is no significant exist between the groups. Hence homogeneity is maintained

POST TEST VALUES: GROUP I AND II

MOTOR ASSESSMENT SCALE:

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 4.21. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is rejected. Thus, there is a significant difference exist between early mobilization training started within 24-48 hours and mobilization training after a week following stroke on gross motor function in hemiparetic stroke subjects.

BARTHEL INDEX:

For 18 degrees of freedom and 5% level of significance, the table‘t’ value is 1.734 and the calculated ‘t’ value is 1.68. Since the calculated‘t’ value lesser than the table‘t’ value the null hypothesis is accepted. Thus, there is no significant difference exist between early mobilization training started within 24-48 hours and mobilization training after a week following stroke on functional outcome in hemiparetic stroke subjects.

6. DISCUSSION

Stroke is considered to be one of the leading causes of disability in society as about 30% to 50% of patients who sustain a stroke are left with considerable residual deficits. 57% of subjects with stroke developed moderate to severe disability at the time of discharge, the disabilities are due to medical complication and motor impairment caused by loss of mobility and activities of daily living.

Motor dysfunction is one of the most frequently encountered and therapeutically constant problems in acute stroke. Therefore the primary source of movement dysfunction (or) universal disability in many hemi paretic stroke patients is due to motor impairment, which will affect the individual's ability to do entire activities of daily living.

In acute stroke the amount of gross motor limitation is not only dependent on level of motor impairments but also dependent on other medical complication such as deconditioning, depression, mood disorder and infection. The early activation and transition of patients as quickly as possible into more intensive rehabilitation minimize complication, accelerate recovery and improve ultimate outcome.

This study was conducted on 20 acute hemiparetic stroke patients, where 10 patients were allocated into the experimental group and was administered with

early mobilization training along with conventional therapy and other 10 was given conventional therapy but mobilized one week after the onset of stroke. Mobilization training was given for 5 days per week about 2 sessions per day. Results were analyzed with gross motor component of motor assessment scale and barthel index scale. Statistical analyses were done with paired‘t’ test and independent‘t’ test.

On statistical analysis of motor assessment scale using paired‘t’ test there was a significant improvement of gross motor function in both control and experimental groups. On analyzing two groups using independent‘t’ test the experimental group had a higher improvement in gross motor function. Even there was significant improvement found in both experimental and control group, comparatively experimental group has shown significant improvement than control group in gross motor function, this might be due to early mobilization which was given to the experimental groups.

In control group, improvement was not seen in sitting to standing and walking components of motor assessment scale, as conventional therapy was given within the bed and they are not mobilized until one week. This suggests that the gross motor function had a significant improvement with the early mobilization training. The results might be due to the two reasons one is

development of impairments which is exist earlier. It's caused by involvement of the upper motor neuron, its pathway and connections. They are weakness, abnormal muscle activation and tone changes, abnormal reflexes, and disordered motor control. Lower extremities lose their strength about twice as fast as upper extremity muscles. **Bernhardt J (2008)** Loss of strength of as much as 40% has been reported within the first week of immobilization, and the antigravity muscles of the calf and back, needed for standing up, become visible to atrophy at a faster rate than non antigravity muscles.[10] These impairments got better of with early mobilization intervention. So rehabilitation of stroke patients should begin as soon as any impairment is apparent. **Sinikka (2007) et al.,** revealed that active training need to be initiated promptly after stroke (i.e.) 2 To 8 days of Post Stroke to promote cortical reorganization and achieve better functional benefits.[62]

Another important reason is development of deconditioning which is due to the bed rest in post stroke. Patients in control group had reduced exercise tolerance and become fatigued easily at relatively low levels of exercise during mobilization. They did not have physical endurance to sit supported to actively participate in the rehabilitation programme. One subject was developed giddiness

due to orthostatic hypotension while mobilizing in control group. Four subjects were developed fever following chest infection. This might also be the one of the reason for inactive participation for rehabilitation. **Fabienne et al (2001)** they emphasize the concept of primary post stroke fatigue, which may develop in the absence of depression (or) significant cognition sequela, and which may be linked to intentional deficits resulting from specific changes to reticular formation and related structures involved in sub cortical net work. In the patients with excellent neurological and neuropsychological recovery, post stroke fatigue may be the only persistent sequela, which may severely limit their return to previous activities.

Sibley K.M, Tang et al (2008) they suggested for those unable to walk quickly enough or unable to walk at all, a recumbent cycle ergometer is a safe and acceptable form of training, which has been successfully used in the subacute (within 14 days) and chronic stages after stroke and can help to counter the deconditioning that occurs after a stroke.[61]

Whereas when considering barthel index there was a significant improvement of functional outcome in both groups. And there was no significant difference exists between the two groups in improving functional outcome. In

both the control and experimental groups, improvement was found only in feeding, transfer, mobility components of barthel index, this is considered due to the direct influence of early mobilization training which includes sitting and standing up. The functional improvements obtained from the subjects of both the groups within the short duration of two weeks were not sufficient enough to produce considerable changes in the scores of barthel index. Also the barthel index scoring has only 3 grades as dependent, partially dependent, and independent which cannot be able identify the minimum detectable changes.

There is no evidence existing against the early mobilization training in acute stage. The literatures suggest that rehabilitation programme should be started as soon as the subject becomes medically stable. **Indredavik(2008)** conducted a study on the impact of early mobilization on physiological variables for acute stroke individuals. The results showed that majority of subjects were able to sit out of bed for 55miutes on first day of stroke with small transitory increase in blood pressure, heart rate and sustained improvements in consciousness and oxygen saturation.[10]

Early mobilization is one of the effective and easy to deliver in acute stage stroke subjects. But further long term study is needed to know the outcome of acute stroke subjects with early mobilization training.

7. SUMMARY AND CONCLUSION

The aim the study was to find the effect of early mobilization training in improving gross motor function and functional outcome of acute stroke subjects. Twenty acute hemi paretic stroke subjects were selected by purposive sampling method in which ten of them were underwent early mobilization training with conventional and another ten subjects conventional with mobilized after one week of stroke onset for study duration of two weeks.

Gross motor function and functional outcome were assessed. Gross motor functions were assessed by gross motor component of motor assessment scale and functional outcome were assessed by barthel index. The data were analyzed by using‘t’test. The results show significant improvement of gross motor function between the groups. But there is no much significant improvement of functional outcome between the two groups.

From this study I concluded, that early mobilization had a beneficial and not a harmful effect in the acute stage stroke subjects. Thus, this may be a simple and effective intervention, which will improve the gross motor function in acute stroke subjects.

9. LIMITATIONS AND SUGGESTIONS

Limitations:

- Sample size was smaller.
- Fine motor function was not considered.
- Follow up was not done.
- No group where no treatment was given.
- Study was a short term.
- Study was done only on middle cerebral artery ischemic stroke.
- Hemorrhagic patients are not included in the study.
- Brunnstorm stages are not included in this study.
- 14 days are not enough to find the functional outcome.

Suggestions:

- Larger population can be included in this study.
- Along with gross motor function, fine motor function can also be considered.

- Study can be done as a long term study.
- These treatment techniques can also be studied with other artery involvement of stroke.
- River mead motor assessment scale can also be used for assess the gross motor function in this study.
- Functional independence measure scale can also use instead of barthel index.

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APPENDIX I

INFORMED CONSENT TO PARTICIPATE IN THE RESEARCH STUDY

I _____ voluntarily consent to participate in the research study "EFFECT OF EARLY MOBILIZIATION TRAINING ON GROSS MOTOR FUNCTION AND FUNCTIONAL OUTCOME IN HEMIPARETIC STROKE SUBJECTS".

The researchers have explained me about the research in brief, the risk of participation and has answered the questions related to the research to my satisfaction.

Signature of the subject: **Signature of the researcher:**

Signature of the witness:

APPENDIX II

ASSESSMENT FORM

NAME:

AGE:

SEX:

IP NUMBER:

ARTERY AND SIDE INVOLVEMENT:

ONSET OF SYMPTOMS:

DATE AND TIME OF ADMISSION:

LEVEL OF CONSCIOUSNESS:

COMMUNICATION:

MOTOR ARM & LEG:

VITAL SIGNS:

	Before treatment	During treatment	After treatment
BP			
HR			
RR			

T			

BALANCE:

	static	dynamic
sitting		
standing		

OUTCOME MEASURES:

- MOTOR ASSESSMENT SCALE

S.NO	PRE TEST	POST TEST

- BARTHEL INDEX SCALE

S.NO	PRE TEST	POST TEST

APPENDIX III

NATIONAL INSTITUTE OF HEALTH STROKE SCALE

1a. Level of consciousness: The investigator must choose a response if a full evaluation prevented by such obstacles as an endotracheal tube, language barrier, orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulus.

0= Alert keenly responsive.

1= Not alert; but arousable by minor stimulation to obey, answer or respond.

2=Not alert; requires repeated stimulation to attend, or is obtunded and require strong or painful stimulation to make movement.

3=Response only with reflex motor or autonomic effects or totally unresponsive, flaccid and areflexic.

1b. LOC Questions: The patient is asked the month and his/her age. The answer must be correct –there is no partial credit for being close. Aphasic and stuporous patients who do not comprehend the questions will score 2. Patients unable to speak because of endotracheal intubation, orotracheal trauma, severe dysarthria from any cause, language barrier, or any other problem not secondary to aphasia are given a 1. It is important that only the initial answer be graded and that the

Examiner not "help" the patient with verbal or non-verbal cues.

0= Answers both questions correctly.

1= Answers one question correctly.

2= Answers neither question correctly.

1c. LOC Commands: The patient is asked to open and close the eyes and then to grip and release the non-paretic hand. Substitute another one step command

if the hands cannot be used. Credit is given if an unequivocal attempt is made but not completed due to weakness. If the patient does not respond to command, the task should be demonstrated to him or her (pantomime), and the result scored (i.e., follows none, one or two commands). Patients with trauma, amputation, or other physical impediments should be given suitable one-step commands. Only the first attempt is scored.

0= Performs both tasks correctly.

1= Performs one task correctly.

2= Performs neither task correctly.

2. Best Gaze: Only horizontal eye movements will be tested. Voluntary or reflexive (oculocephalic) eye movements will be scored,but caloric testing is not done. If the patient has a conjugate deviation of the eyes that can be overcome by voluntary or reflexive activity, the score will be 1. If a patient has an isolated peripheral nerve paresis (CN III, IV or VI), score a 1. Gaze is testable in all aphasic Patients. Patients with ocular trauma, bandages, pre-existing blindness, or other disorder of visual acuity or fields should be tested with reflexive movements, and a choice made by the investigator. Establishing eye contact and then moving about

The patient from side to side will occasionally clarify the presence of a partial gaze palsy.

0=Normal.

1=partial gaze palsy; gaze is abnormal in one or either eyes, but forced deviation or total gaze paresis is not present.

2=Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.

3. Visual: Visual fields (upper and lower quadrants) are tested by confrontation, using finger counting or visual threat, as appropriate. Patients may be encouraged, but if they look at the side of the moving fingers appropriately, this can be scored as normal. If there is unilateral blindness or enucleation, visual fields in the remaining eye are scored. Score 1 only if a clear-cut asymmetry, including quadrantanopia, is found. If patient is blind from any cause, score 3. Double simultaneous stimulation is performed at this point. If there is extinction, patient receives a 1, and the results are used to respond to item 11.

0= No visual loss.

1= Partial hemianopia.

2=complete hemianopia.

3 = Bilateral hemianopia (blind including cortical blindness).

4. Facial Palsy: Ask – or use pantomime to encourage – the patient to show teeth or raise eyebrows and close eyes. Score symmetry of grimace in response to noxious stimuli in the poorly responsive or non-comprehending patient. If facial trauma/bandages, orotracheal tube, tape or other physical barriers obscure the face, these should be removed to the extent possible.

0= Normal symmetrical movements.

1= Minor paralysis (flattened nasolabial fold, asymmetry on smiling).

2=Partial paralysis (total or near-total paralysis of lower face).

3 = Complete paralysis of one or both sides (absence of facial movement in the upper and lower face).

5. Motor Arm: The limb is placed in the appropriate position: extend the arms (palms down) 90 degrees (if sitting) or 45 degrees (if supine).Drift is scored if the arm falls before 10 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Only in the case of amputation or joint fusion at the shoulder, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.

0=no drift; limb holds 90 (or 45) degrees for full 10 seconds.

1=Drift; limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support.

2= some effort against gravity; limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity.

3=No effort against gravity; limb falls.

4=No movement.

UN =Amputation or joint fusion, explain

5a. Left Arm.

5b. Right Arm.

6. Motor Leg: The limb is placed in the appropriate position: hold the leg at 30 degrees (always tested supine). Drift is scored if the leg falls before 5 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is teach limb tested in turn, beginning with the non-paretic leg. Only in the case of amputation or joint fusion at the hip, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.

0=No drift; leg holds 30-degree position for full 5 seconds.

1= Drift; leg falls by the end of the 5-second period but does not hit bed.

2=some effort against gravity; leg falls to bed by 5 seconds, but has some effort against gravity.

3= No effort against gravity**;** leg falls to bed immediately.

4= No movement.

UN = Amputation or joint fusion, explain.

6a. Left Leg

6b. Right Leg.

7. Limb Ataxia: This item is aimed at finding evidence of a unilateral cerebellar lesion. Test with eyes open. In case of visual defect, Ensure testing is done in intact visual field. The finger-nose-finger and heel-shin tests are performed on both sides, and ataxia is scored only if present out of proportion to weakness. Ataxia is absent in the patient who cannot understand or is paralyzed. Only in the case of amputation or joint fusion, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice. In case of blindness, test by having the patient touch nose from extended arm position.

0= Absent.

1 = Present in one limb.

2= Present in two limbs.

UN = Amputation or joint fusion, explain.

8. Sensory: Sensation or grimace to pinprick when tested, or withdrawal from noxious stimulus in the obtunded or aphasic patient. Only sensory loss attributed to stroke is scored as abnormal and the examiner should test as many body areas (arms [not hands], legs, trunk, face) as needed to accurately check for hemisensory loss. A score of 2, "severe or total sensory loss," should only be given when a severe or total loss of sensation can be clearly demonstrated. Stuporous and aphasic patients will, therefore, probably score 1 or 0. The patient with brainstem stroke who has bilateral loss of sensation is scored 2. If the patient does not respond and is quadriplegic, score 2. Patients in a coma (item 1a=3) are automatically given a 2 on this item.

0 = Normal; no sensory loss.

1= Mild-to-moderate sensory loss; patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched.

2= Severe to total sensory loss**;** patient is not aware of being touched in the face, arm, and leg.

9. Best Language: A great deal of information about comprehension will be obtained during the preceding sections of the examination. For this scale item, the patient is asked to describe what is happening in the attached picture, to name the items on the attached naming sheet and to read from the attached list of sentences. Comprehension is judged from responses here, as well as to all of the commands in the preceding general neurological exam. If visual loss interferes with the tests, ask the patient to identify objects placed in the hand, repeat, and produce speech. The intubated patient should be asked to write. The patient in a coma (item 1a=3)

Will automatically score 3 on this item. The examiner must choose a score for the patient with stupor or limited cooperation, but a score of 3 should be used only if the patient is mute and follows no one-step commands.

0= No aphasia**;** normal.

1= Mild-to-moderate aphasia; some obvious loss of fluency or facility of comprehension, without significant limitation on ideas expressed or for of expression. Reduction of speech and/or comprehension, however, makes conversation about provided materials difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card content from patient's response.

2 = Severe aphasia; all communication is through fragmentary expression; great need for inference, questioning, and guessing by the listener. Range of information that can be exchanged is limited; listener carries burden of communication. Examiner cannot identify materials provided from patient response.

3 = Mute, global aphasia; no usable speech or auditory comprehension.

10. Dysarthria: If patient is thought to be normal, an adequate sample of speech must be obtained by asking patient to read or repeat words from the attached list. If the patient has severe aphasia, the clarity of articulation of spontaneous speech can be rated. Only if the patient is intubated or has other physical barriers to producing speech, the examiner should record the score as untestable (UN), and clearly write an explanation for this choice. Do not tell the patient why he or she is being tested.

0= Normal.

1= Mild-to-moderate dysarthria; patient slurs at least some words and, at worst, can be understood with some difficulty.

2 = Severe dysarthria**;** patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric.

UN = Intubated or other physical barrier, explain.

11. Extinction and Inattention (formerly Neglect): Sufficient information to identify neglect may be obtained during the prior testing. If the patient has a severe visual loss preventing visual double simultaneous stimulation, and the cutaneous stimuli are normal, the score is normal. If the patient has aphasia but does appear to attend to both sides, the score is normal. The presence of visual spatial neglect or anosagnosia may also be taken as evidence of abnormality. Since the abnormality is scored only if present, the item is never untestable.

0= No abnormality**.**

1= Visual, tactile, auditory, spatial, or personal inattention or extinction to bilateral simultaneous stimulation in one of the sensory modalities.

2 = Profound hemi-inattention or extinction to more than one modality; does not recognize own hand or orients to only one side of space.

APPENDIX IV

FUNCTIONAL BALANCE GRADES

Normal- Patient able to maintain steady balance without handhold support (static). Patients Accepts maximal challenge and can shift weight easily within full range in all directions (dynamic).

Good- Patient able to maintain balance without handhold support limited postural sway (static).Patient Accepts moderate challenge; able to maintain balance while picking object off floor (dynamic).

Fair- Patient able to maintain balance with handhold support; may require occasional minimal assistance (static). Patients accepts minimal challenge; able to maintain balance while turning head/trunk (dynamic).

Poor- Patient requires handhold support and moderate to maximal assistance to maintain position (static).Patient unable to accept challenge or move without loss of balance (dynamic).

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APPENDIX V

MOTOR ASSESSMENT SCALE

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Supine to Side-lying onto intact side (starting position: supine with knees straight)

1. Uses intact arm to pull body toward intact side. Uses intact leg to hook impaired leg to pull it over.
2. Actively moves impaired leg across body to roll but leaves impaired arm behind.
3. Impaired arm is lifted across body with other arm. Impaired leg moves actively & body follows as a block.
4. Actively moves impaired arm across body. The rest of the body moves as a block.
5. Actively moves impaired arm and leg rolling to intact side but overbalances.
6. Rolls to intact side in 3 seconds without use of hands.

Supine to Sitting over side of bed

1. Pt assisted to the side-lying position: Patient lifts head sideways but can't sit up.
2. Pt may be assisted to side-lying & is assisted to sitting but has head control throughout.
3. Pt may be assisted to side-lying & is assisted with lowering LEs off bed to assume sitting.
4. Pt may be assisted to side-lying but is able to sit up without help.
5. Pt able to move from supine to sitting without help.
6. Pt able to move from supine to sitting without help in 10 seconds.

Balance Sitting

1. Pt is assisted to sitting and needs support to remain sitting.
2. Pt sits unsupported for 10 seconds with arms folded, knees and feet together & feet on the floor.
3. Pt sits unsupported with weight shifted forward and evenly distributed over both hips / legs. Head and thoracic spine extended.
4. Sits unsupported with feet together on the floor. Hands resting on thighs. Without moving the legs the patient turns the head and trunk to look behind the right and left shoulders.
5. Sits unsupported with feet together on the floor. Without allowing the legs or feet to move & without holding on the patient must reach forward to touch the floor (10 cm or 4 inches in front of them).The affected arm may be supported if necessary.
6. Sits on stool unsupported with feet on the floor. Pt reaches sideways without moving the legs or holding on and returns to sitting position. Support affected arm if needed.

Sitting to Standing

1. Pt assisted to standing – any method.
2. Pt assisted to standing. The patient's weight is unevenly distributed & may use hands for support.
3. Pt stands up. The patient's weight is evenly distributed but hips and knees are flexed – No use of hands for support.
4. Pt stands up. Remains standing for 5 seconds with hips and knees extended with weight evenly distributed.
5. Pt stands up and sits down again. When standing hips & knees are extended with weight evenly distributed.
6. Pt stands up and sits down again 3 x in 10 seconds with hips & knees extended & weight evenly distributed.

Walking

1. With assistance the patient stands on affected leg with the affected weight bearing hip extended and steps forward with the intact leg.
2. Walks with the assistance of one person.
3. Walks 10 feet or 3 meters without assistance but with an assistive device.
4. Walks 16 feet or 5 meters without a device or assistance in 15 seconds.
5. Walks 33 feet or 10 meters without assistance or a device. Is able to pick up a small object from the floor with either hand and walk back in 25 seconds.
6. Walks up and down 4 steps with or without a device but without holding on to a rail 3 x in 35 seconds.

Upper Arm Function

1. Supine: Therapist places affected arm in 90 degrees shoulder flexion and holds elbow in extension – hand toward ceiling. The patient protracts the affected shoulder actively.
2. Supine: Therapist places affected arm in above position. The patient must maintain the position for 2 seconds with some external rotation and with the elbow in at least 20 degrees of full extension.
3. Supine: Patient assumes above position and brings hand to forehead and extends the arm again. (flexion & extension of elbow) Therapist may assist with supination of forearm.
4. Sitting: Therapist places affected arm in 90 degrees of forward flexion. Patient must hold the affected arm in position for 2 seconds with some shoulder external rotation and forearm supination. No excessive shoulder elevation or pronation.
5. Sitting: Patient lifts affected arm to 90 degrees forward flexion - holds it there for 10 seconds and then lowers it with some shoulder external rotation and forearm supination. No pronation.

6. Standing: Have patient's affected arm abducted to 90 degrees with palm flat against wall. Patient must maintain arm position while turning body toward the wall.

Hand Movements

1. Sitting at a table (Wrist Extension): Affected forearm resting on table. Place cylindrical object in palm of patient's hand.Patient asked to lift object off table by extending the wrist – no elbow flexion allowed.
2. Sitting at a table (Radial Deviation of Wrist): Therapist should place forearm with ulnar side on table in mid-pronation /supination position. Thumb in line with forearm and wrist in extension. Fingers around cylindrical object. Patient is asked to lift hand off table. No wrist flexion or extension.
3. Sitting (Pronation / Supination): Affected arm on table with elbow unsupported at side. Patient asked to supinate and pronate forearm (¾ range acceptable).
4. Place a 5 inch ball on the table so that the patient has to reach forward with arms extended to reach it. Have the patient reach forward with shoulders protracted, elbows extended, wrist in neutral or extended, pick up the ball with both hands and put it back down in the same spot.
5. Have the patient pick up a polystyrene cup with their affected hand and put it on the table on the other side of their body without any alteration to the cup.
6. Continuous opposition of thumb to each finger 14 x in 10 seconds. Each finger in turn taps the thumb, starting with the indexfinger. Do not allow thumb to slide from one finger to the other or go backwards.

TOTAL SCORE (O-42)

APPENDIX VI

BARTHEL INDEX

Activity Score

FEEDING

0 = unable

5 = needs help cutting, spreading butter, etc., or requires modified diet

10 = independent

BATHING

0 = dependent

5 = independent (or in shower)

GROOMING

0 = needs to help with personal care

5 = independent face/hair/teeth/shaving (implements provided)

DRESSING

0 = dependent

5 = needs help but can do about half unaided

10 = independent (including buttons, zips, laces, etc.)

BOWELS

0 = incontinent (or needs to be given enemas)

5 = occasional accident

10 = continent

BLADDER

0 = incontinent, or catheterized and unable to manage alone

5 = occasional accident

10 = continent

TOILET USE

0 = dependent

5 = needs some help, but can do something alone

10 = independent (on and off, dressing, wiping)

TRANSFERS (BED TO CHAIR AND BACK)

0 = unable, no sitting balance

5 = major help (one or two people, physical), can sit

10 = minor help (verbal or physical)

15 = independent

MOBILITY (ON LEVEL SURFACES)

0 = immobile or < 50 yards

5 = wheelchair independent, including corners, > 50 yards

10 = walks with help of one person (verbal or physical) > 50 yards

15 = independent (but may use any aid; for example, stick) > 50 yards

STAIRS

0 = unable

5 = needs help (verbal, physical, carrying aid)

10 = independent

TOTAL (0–100): _____

APPENDIX VII

DATA PRESENTATION

Control group I

S.NO	Motor assessment scale		Barthel index	
	Pre	Post	Pre	Post
1.	4	8	35	35
2.	5	8	35	40
3.	7	9	25	30
4.	7	9	25	30
5.	6	8	25	30
6.	8	10	35	35
7.	8	15	30	35

8.	8	9	25	30
9.	9	10	25	35
10.	9	11	25	25

Experimental group II

S.NO	Motor assessment scale		Barthel index	
	Pre	Post	Pre	Post
1.	5	13	30	35
2.	5	15	35	45
3.	8	15	30	35

4.	5	9	25	30
5.	8	18	30	35
6.	7	17	30	35
7.	6	18	30	40
8.	7	18	30	30
9.	6	14	20	20
10.	6	14	30	35